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EXAMINER	
KAO, CHIH CHENG G	

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 08/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/065,683	KEVILLE ET AL.
	Examiner	Art Unit
	Chih-Cheng Glen Kao	2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35,37-95,97-123,139,140,157,158,161-168,177,178 and 191-200* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *139,140,157,158,161-168,177,178 and 191-200* is/are allowed.

6)☒ Claim(s) *1-23,26,27,32-35,37,44,45,50-53,55-83,86,87,92-95,97,104,105,110-113 and 115-123* is/are rejected.

7)☒ Claim(s) *24,25,28-31,38-43,46-49,54,84,85,88-91,98-103,106-109 and 114* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informality. In paragraph 91, line 2, "means644" appears to be grammatically incorrect, since a space appears to be missing between "means" and "644". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-35, 37-61, and 122 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In the original application, Applicants disclosed a cell for identifying and measuring concentrations. However, there is no mention of an "equivalent cell" for identifying and measuring. This subject matter was not described in the original specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the

application was filed, had possession of the claimed invention. As such, the claims have been rejected for adding new matter.

3. Claims 1-35, 37-96, and 98-123 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

An energy channel, as exemplified in claim 1 with at least one background data energy channel, of a preconcentration cell is not described in the original specification in such a way as to enable one skilled in the art to make the invention. It is unclear how to make a preconcentration cell with an energy channel. The original specification describes using a multi-channel analyzer with an energy channel, but not the cell. Therefore, the claims are rejected for enablement issues.

Secondly, the claims are not enabled for photons to be emitted from energy channels, as exemplified in claim 1 with a background data energy channel. The original specification does not describe in such a way as to enable one skilled in the art to make a preconcentration cell comprising an energy channel to emit photons. Therefore, the claims are rejected for enablement issues.

4. Claims 1-35, 37-61, and 122 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the

elements. See MPEP § 2172.01. The omitted elements are: means for obtaining data and means for analyzing data.

The claims recite a system for identifying and measuring concentrations comprising an ionic preconcentration cell and data. However, it is unclear how such a system can identify and measure concentrations without a means for obtaining data and a means for analyzing data. A system cannot identify and measure concentrations with only a preconcentration cell and data. Therefore, the claims are rejected for omitting essential elements.

5. Claims 1-35, 37-61, and 122 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: means for obtaining data and means for analyzing data associated with said cell to identify and measure concentrations of elements in fluids.

The recitations as exemplified in claim 1, essentially recite a system for identifying and measuring concentrations comprising an ionic preconcentration cell and data. However, it is unclear how such data structure is defined by any structural and functional interrelationships between the data structure and the other claimed aspects of the invention, which permit the data structure's functionality to be realized. Means for obtaining data and means for analyzing data are essential in order to identify and measure concentrations. A system cannot identify and measure concentrations without means for obtaining data and means for analyzing data.

Therefore, the claims are rejected for omitting essential structural cooperative relationships of elements.

The Examiner has examined the claims as best understood as follows.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 2, 4-8, 10-16, 18-23, 33-35, 37, 50-53, 55-58, 62, 64-68, 70-76, 78-83, 93-95, 97, 110-113, and 115-118 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. (US Patent 6309532) in view of Kump et al. ("Determination of Trace Elements in Mineral Water Using Total Reflection X-ray Fluorescence Spectrometry after Preconcentration with Ammonium Pyrrolidinedithiocarbamate").

7. Regarding claims 1, 2, and 62, Tran et al. discloses system and method (col. 32, lines 45-48 and 54-56) comprising an ionic preconcentration cell (fig. 24), comprising an upper high surface area electrode (fig. 24, #524, and col. 30, lines 62-65), a lower high surface area electrode substantially parallel to the upper electrode (fig. 24, #526, and col. 31, lines 7-9), a central flow interelectrode gap (fig. 24, #530), fluid flow means for flowing a fluid (fig. 24, inflow and outflow), and voltage application means for applying a voltage differential between the electrodes while the fluid is flowing through the gap (fig. 24, (+) and (-)).

However, Tran et al. does not disclose calibration data comprising background data related to a rate at which photons are detected from at least one background data energy channel, when using a highly purified form of a fluid of interest.

Kump et al. teaches calibration data comprising background data related to a rate at which photons are detected from at least one background data energy channel, when using a highly purified form of a fluid of interest (table 3, concentrations for Zn).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. with the calibration of Kump et al., since one would be motivated to make such a modification to better interpret data (page 235, col.1, 1st paragraph) as implied from Kump et al.

8. Regarding claims 4, 5, 64, and 65, Tran et al. further discloses upper and lower x-ray (col. 16, lines 13-15) transmission windows in intimate contact with the electrodes (fig. 29, #603 and 605) and voltage application means for applying a voltage differential between the electrodes while the fluid is flowing through the gap (fig. 24, (+) and (-)).

9. Regarding claims 6, 7, 11, 12, 66, 67, 71, and 72, Tran et al. further discloses planar inlet and outlet flow means comprising a slot substantially coplanar with the gap (fig. 24, inflow and outflow).

10. Regarding claims 8, 13, 68, and 73, Tran et al. further discloses a plurality of flow tubes mutually-substantially coplanar with the gap and substantially parallel with one another (fig. 10, "inflow" and "outflow").

11. Regarding claims 10, 14, 70, and 74, Tran et al. further discloses access means for physically cleaning debris from inlet flow means (col. 18, lines 21-30).

12. Regarding claims 15 and 75, Tran et al. further discloses a body maintaining a position comprising a material comprising substantially no conductivity, resistance to ionic leaching, and resistance to radiation degradation (fig. 17, #352).

13. Regarding claims 16 and 76, Tran et al. further discloses a body maintaining a position comprising a material selected from a material group consisting of: plastic, glass, and fiberglass (col. 22, lines 23-24).

14. Regarding claims 18, 19, 34, 35, 78, 79, 94, and 95, Tran et al. further discloses an electrode thickness which would necessarily be less than or equal to $l = 1 / (\mu \rho)$ (col. 13, line 50), since it is within the range.

15. Regarding claims 20, 21, 80, and 81, Tran et al. would necessarily have electrodes having an ordinary surface area approximately equal to an interrogation spot area to which the cell is exposed (col. 33, lines 3-4).

16. Regarding claims 22, 23, 82, and 83, Tran et al. further discloses a gap width with a minimum gap width selected from a group consisting of 2 mm, 1mm, .5 mm, and .25 mm, and a maximum gap width selected from a group consisting of 2 mm, 5 mm, and 10 mm, which would necessarily be within the range of

$$d = \frac{\sigma \Phi}{q \varepsilon} \frac{w_i}{w_f} \frac{A}{n_f C F} \times 100\% \approx 2 \times 10^{-9} \frac{\Phi w_i A}{q \varepsilon w_f n_f F} \times 100\% \propto \frac{\Phi A}{\varepsilon F} \quad ,$$

since the gap width is within that range (col. 29, line 7).

17. Regarding claims 33 and 93, Tran et al. further discloses nano-cellular carbon aerogel (col. 9, lines 60-67).

18. Regarding claims 37 and 97, Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose calibration data comprising sensitivity data when using a first calibration solution containing at least one element of interest in a fluid of interest in known concentration above a minimum detection level of x-ray detection equipment.

Kump et al. teaches calibration data comprising sensitivity data when using a first calibration solution containing at least one element of interest in a fluid of interest in known concentration above a minimum detection level of x-ray detection equipment (table 3, concentrations for Zn).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. with the calibration of

Kump et al., since one would be motivated to make such a modification to better interpret data (page 235, col.1, 1st paragraph) as implied from Kump et al.

19. Regarding claims 50 and 110, Tran et al. further discloses a voltage differential below an electrochemical potential of at least one element of interest and below an electrolysis potential of the fluid (col. 19, lines 43-49).

20. Regarding claims 51, 52, 111, and 112, Tran et al. further discloses leakage current monitoring means or ultra-low trace measuring means (fig. 5, #145) for monitoring a total non-saturated concentration of dissolved ions in said upper and lower high surface area electrodes, which is occurring prior to breakthrough (col. 15, lines 63-67).

21. Regarding claims 53 and 113, Tran et al. further discloses leakage current monitoring (fig. 5, #145), for monitoring a total concentration of dissolved ions in said upper and lower high surface area electrodes while said electrodes are not saturated, which is occurring prior to breakthrough (col. 15, lines 63-67), and flow rate adjustment means for adjusting flow to control a percentage of ions extracted from said fluid, based on said monitoring of said leakage current by said leakage current monitoring means (fig. 5, #128, and col. 14, lines 51-53).

22. Regarding claims 55-57 and 115-117, Tran et al. further discloses triggering means (col. 14, lines 35-44) for injecting at least one element in the fluid or diluting (col. 7, lines 8-15) when

the fluid has passed a predetermined, non-saturated threshold concentration, thereby maintaining said concentration within a predetermined concentration range (col. 12, lines 5-9).

23. Regarding claims 58 and 118, Tran et al. further discloses ionic release means for cleaning by releasing ions accumulated within said surface area into said fluid (col. 15, lines 4-8).

24. Claims 3, 45, 63, 105, 122, and 123 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Kump et al. as respectively applied to claims 2 and 62 above, and further in view of Fajt et al. (US Patent 6045685).

25. Regarding claims 3, 45, 63, and 105, Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose a transportable voltage supply for connection during transport.

Fajt et al. teaches a transportable voltage supply for connection during transport (col. 13, lines 29-36).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the transportable voltage supply of Fajt et al., since one would be motivated to make such a modification for lowering costs and high portability of the system (col. 13, lines 29-37) as implied from Fajt et al.

26. Regarding claims 122 and 123, Tran et al. as modified above suggests a system as recited above.

However, Tran et al. does not disclose a transportable voltage supply embedded into a body.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with a transportable voltage supply embedded, since rearranging parts of an invention involves only routine skill in the art. One would be motivated to embed a transportable voltage supply to make the device more compact or easier to carry.

27. Claims 9 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Kump et al. as respectively applied to claims 6 and 66 above, and further in view of Taylor et al. (US Patent 4467206).

Tran et al. as modified above suggests a system and method as recited above. Tran et al. further discloses extraction of at least one element from the flow (abstract).

However, Tran et al. does not disclose turbulence enhancement means for enhancing a turbulence of flow of fluid to induce mixing of flow to enable uniform flow.

Taylor et al. teaches turbulence enhancement means for enhancing a turbulence of flow of fluid to induce mixing of flow to enable uniform flow (col. 10, lines 43-48).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with

the turbulence enhancement means of Taylor et al., since one would be motivated to make such a modification for more uniform distribution (col. 10, lines 43-48) as shown by Taylor et al.

28. Claims 17 and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Kump et al. as respectively applied to claims 4 and 64 above, and further in view of Malcolm et al. (US Patent 4979198).

Tran et al. as modified above suggests a system and method as recited above. Tran et al. further discloses maintaining a cell body position (fig. 19).

However, Tran et al. does not disclose a non-conducting, machinable polymer substantially resistant to radiation degradation.

Malcolm et al. teaches a non-conducting, machinable polymer substantially resistant to radiation degradation (col. 5, lines 38-40).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the polymer of Malcolm et al., since one would be motivated to make such a modification to better allow x-rays through (col. 5, lines 38-40) as implied from Malcolm et al.

Also note that it would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the polymer, since it is within the general skill of a worker in the art to select a known material motivated by its suitability, wherein the suitability for this case is better allowing x-rays through (col. 5, lines 38-40) as shown by Malcolm.

29. Claims 44, 59, 60, 104, 119, and 120, are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Kump et al. as respectively applied to claims 4, 62, and 64 above, and further in view of Ma (US Patent 6012325).

Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose an x-ray source means positioned and aligned relative to an x-ray transmission window for exposing a cell to x-rays substantially transmitted through the window, and x-ray fluorescence analysis means for analyzing and deducing a concentration.

Ma teaches an x-ray source means (fig. 1, #20) positioned and aligned relative to an x-ray transmission window (fig. 2, #32) for exposing a cell to x-rays substantially transmitted through the window (abstract), and x-ray fluorescence analysis means for analyzing (col. 5, line 10) and deducing a concentration (abstract).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the x-ray source and analysis means of Ma, since one would be motivated to make such a modification to sample the liquid without needing cryogenic fluids (col. 1, lines 49-53) as shown by Ma.

30. Claims 61 and 121 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Kump et al. as applied to claims 1 and 62 above, and further in view of Polichar et al. (US Patent 5608774).

Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose a telecommunications link for downloading and analyzing data.

Polichar et al. teaches a telecommunications link for downloading and analyzing data (col. 5, lines 58-64).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the telecommunications link of Polichar et al., since one would be motivated to make such a modification to more easily send data to a remote site (col. 5, lines 58-64) as implied from Polichar et al.

31. Claims 26, 27, 32, 86, 87, and 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al., Kump et al., and Lubecki et al. as respectively applied to claims 1, 4, 5, 62, 64, and 65 above, and further in view of Nelson (US Patent 5982847).

32. Regarding claims 26, 27, 86, and 87, Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose a polyimid film comprising structural rigidity to support up to 1/10 atm. of pressure without bowing more than approximately 100 microns.

Nelson teaches a polyimid film comprising structural rigidity to support up to 1/10 atm. of pressure without bowing more than approximately 100 microns (col. 10, lines 1-8).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with

the polyimid film of Nelson, since one would be motivated to make such a modification to better allow x-rays through (col. 10, lines 1-8) as implied from Nelson et al.

Also note that it would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the polyimid film, since it has been held to be within the general skill of a worker in the art to select a known material motivated by its suitability, wherein the suitability for this case is better allowing x-rays through (col. 10, lines 1-8) as implied from Nelson.

33. Regarding claims 32 and 92, Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose x-ray transparency greater than approximately 90% for characteristic photon energies from an element of interest for which a fluidic concentration is to be measured.

Nelson teaches x-ray transparency for characteristic photon energies from an element of interest for which a fluidic concentration is to be measured (col. 10, lines 1-8).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the transparency of Nelson, since one would be motivated to make such a modification to better allow x-rays through (col. 10, lines 1-8) as implied from Malcolm et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the transparency greater than 90%, since where the general conditions of a claim are disclosed in

the prior art, discovering the optimum of working ranges involves only routine skill in the art. One would be motivated to make transparency greater than 90% to obtain a stronger signal.

Allowable Subject Matter

34. The indicated allowability of claims 36, 37, 96, and 97 are withdrawn in view of the newly discovered reference(s) to Kump et al. Rejections based on the newly cited reference(s) are as recited above.

35. Claims 139, 150, 157, 158, 161-168, 177, 178, and 191-200 contain allowable subject matter. Claims 24, 25, 28-31, 38-43, 46-49, 54, 84, 85, 88-91, 98-103, 106-109, 114, would be allowable if respectively rewritten to overcome the rejection(s) under 35 U.S.C. 112, set forth in this Office action and to include all of the limitations of the claim, intervening claims, and base claim.

36. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 24, 84, 139, and 157, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including an upper transmission window comprising an atomic number below 10, structural rigidity to support up to 1/10 atm. of pressure without bowing more than approximately 100 microns, substantial impermeability relative to fluid, x-ray transparency greater than 90% for characteristic photon energies from an element of interest for which a fluidic concentration is to be measured, x-ray scattering therefrom minimized to less than approximately 10% of radiation scattered from a

column of fluid equal to one optical depth in the fluid of a characteristic photonic energy from an element of interest for which a fluidic concentration is to be measured, and freedom from any single contaminant in excess of 1 part per million, when measured by x-ray fluorescence, in combination with all the limitations in each respective claim, intervening claim, and base claim.

Regarding claims 25, 85, 140, and 158, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including a lower transmission window comprising an atomic number below 10, structural rigidity to support up to 1/10 atm. of pressure without bowing more than approximately 100 microns, substantial impermeability relative to fluid, x-ray transparency greater than 90% for characteristic photon energies from an element of interest for which a fluidic concentration is to be measured, x-ray scattering therefrom minimized to less than approximately 10% of radiation scattered from a column of fluid equal to one optical depth in the fluid of a characteristic photonic energy from an element of interest for which a fluidic concentration is to be measured, and freedom from any single contaminant in excess of 1 part per million, when measured by x-ray fluorescence,, in combination with all the limitations in each respective claim, intervening claims, and base claim.

Regarding claims 28 and 88, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including electrode material comprising a large plurality of pores characterized by a specific surface area of at least approximately 100 m^2/g, an average pore diameter of said pores between approximately 30 nm and 10 nm per pore, a distribution of the pore diameters grouped with a standard deviation of less than approximately 20 nm around said average pore diameter, x-ray scattering therefrom minimized to less than an x-ray transparency greater than approximately 90% for characteristic

photon energies from an element of interest for which a fluidic concentration is to be measured; electrical conductivity of 10-40 mOhms-cm when fabricated into a 1/4 mm thick electrode, the ability to contain approximately at least 0.1% by weight of foreign material relative to said high surface area material prior to saturation, high structural rigidity wherein a displacement under the flow of said fluid does not exceed approximately 0.25mm, high wetting ability wherein an approximately 1/4 mm thick sheet of said high surface area material becomes substantially wetted in less than approximately three seconds, and freedom from metallic impurities in excess of approximately .5 parts per million, when measured by x-ray fluorescence analysis, in combination with all the limitations in each respective claim and base claim. Claims 29-31 and 89-91 contain allowable subject matter by virtue of their dependency.

Regarding claims 38, 39, 98, and 99, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including ion extraction rate data related to a rate at which photons are detected to be emitted from at least one ion extraction rate data energy channel of said preconcentration cell, when a calibration solution, containing said at least one element of interest in a fluid of interest in known concentration below a minimum detection level of x-ray detection equipment to be used for said detecting and measuring, is flowed through the central flow interelectrode gap of said preconcentration cell, at a substantially constant flow rate, while the voltage application means applies the voltage differential across the electrodes of said preconcentration cell, below an electrochemical potential of said at least one element of interest and below an electrolysis potential of said calibration solution, and when said preconcentration cell is exposed to x-rays, in combination

with all the limitations in each respective claim, intervening claim, and base claim. Claims 42, 43, 102, and 103 contain allowable subject matter by virtue of their dependency.

Regarding claims 40 and 100, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including test data accumulation means for obtaining test data comprising data related to a rate at which photons are detected when fluid flows at a substantially constant rate, while a voltage application means applies a voltage differential below an electrochemical potential of at least one element of interest and below an electrolysis potential of the fluid, in combination with all the limitations in each respective claim, intervening claim, and base claim. Claims 41 and 101 contain allowable subject matter by virtue of their dependency.

Regarding claims 46, 48, 106, 108, 191, and 195, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including flow control means to maintain ε below approximately 5% for at least one element of interest, in combination with all the limitations in each respective claim, intervening claim, and base claim. Claims 47, 49, 107, 109, 192-194, and 196-198 contain allowable subject matter by virtue of their dependency.

Regarding claims 54, 114, 199, and 200, prior art does not disclose or fairly suggest an apparatus or method for identifying and measuring concentrations of elements in fluids including time control means for flowing fluid for a time t given by

$$t \propto \frac{Sl}{\sigma} \propto \frac{Sl}{C},$$

in combination with all the limitations in each respective claim.

Regarding claim 161, prior art does not disclose or fairly suggest a method including optimizing an upper high surface area electrode with an upper electrode thickness less than or equal to approximately an optical depth 1 of said upper high surface area electrode when wetted with a fluid to be flowed through a cell, in combination with all the limitations in each respective claim. Claims 162-164 contain allowable subject matter by virtue of their dependency.

Regarding claim 165, prior art does not disclose or fairly suggest a method including optimizing an upper high surface area electrode with an upper electrode thickness less than or equal to approximately an optical depth 1 of said upper high surface area electrode when wetted with an element of interest for which a fluidic concentration is to be measured by a cell, in a fluid to be flowed through said cell, in combination with all the limitations in each respective claim. Claims 166-168 contain allowable subject matter by virtue of their dependency.

Regarding claim 177, prior art does not disclose or fairly suggest a method including optimizing an interelectrode gap range specified by:

$$d = \frac{\sigma \Phi}{q\varepsilon}\frac{w_i}{w_f}\frac{A}{n_f CF} x100\% \approx 2x10^{-9}\frac{\Phi w_i A}{q\varepsilon w_f n_f F} x100\% \propto \frac{\sigma A}{\varepsilon F},$$

in combination with all the limitations in each respective claim. Claim 178 contains allowable subject matter by virtue of their dependency.

Response to Amendment

37. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn. Applicants' arguments with respect to claims 1-23, 26, 27, 32-35, 37, 44, 45, 50-53, 55-83, 86, 87, 92-95, 97,

104, 105, 110-113, 115-123 have been considered but are moot in view of the new ground(s) of rejection. Applicants' arguments filed 7/19/05 have been fully considered but they are not persuasive in overcoming various aspects of the prior art.

38. Regarding Applicants' arguments in point 5 of the Amendment filed 7/19/05, the added recitations do not overcome the rejection under 35 U.S.C. 112, second paragraph. Applicants argue that data suitably-recited in an apparatus or system claim and further recited as cooperating with other structural elements is itself a structural element. The Examiner disagrees with this assessment. The data as recited in the claims has no physical structure. Therefore, it is not a structural element.

39. Regarding Applicants' arguments in point 11 of the Amendment, Applicants argue that Tran et al. does not disclose measuring concentration. The Examiner disagrees. Finding the point of saturation in a cell is a method for measuring concentration. For example, if analysis indicates that the cell is to the point of saturation, one can measure that the concentration of the cell is greater than zero parts per billion for the ion of interest. Therefore, Tran et al. does disclose or suggest anything about how to measure concentration.

40. Regarding Applicants' arguments in point 12 of the Amendment, Applicants argue that Tran et al. does not disclose windows in any type of contact with an electrode. The Examiner disagrees. Tran et al. does disclose a window in intimate contact with an electrode (fig. 29, #603 and 605).

Applicants further argue that the windows are not transmissive windows for x-rays. Applicants further cite titanium as not having the necessary material properties to serve as a transmission window. The Examiner disagrees. In column 16, lines 13-20, Tran et al. discloses radiation sensors for x-ray fluorescence being placed directly on the cell. As noted by Applicants, a material such as titanium is used as a plate for the cell. Therefore, Tran et al. discloses a cell having x-ray having transmissive windows. Furthermore, titanium is known in the art to be used as a transmission window. Shefer et al. (US Patent 6148061) is cited here to show that titanium does have the necessary material properties to serve as a transmission window (claim 8). Therefore, these plates can be characterized as being x-ray transmissive. Furthermore, just because a device marketed by Tran et al. employing 1/8" to 1/4" thick plates through which no x-rays are ever passed, does not mean the patent does not disclose a cell with windows for x-ray fluorescence (col. 40, lines 39-43).

41. Regarding Applicants' arguments in points 13-15 of the Amendment, Applicants argue that Tran et al. does not disclose slots substantially coplanar with the interelectrode gap because the figures are schematics. The Examiner disagrees. If one has a schematic of a device, one would build the device exactly as based on the schematic first, thus having a device with the same physical characteristics. Then, any repositioning of components would be obvious modifications of that structure. Therefore, Tran et al. does disclose the physical characteristics.

42. Regarding Applicants' arguments in points 16-19 of the Amendment, the Examiner again notes that the features upon which applicant relies (i.e., sizing the electrodes in relation to the x-

rays) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. The recitation of "an ordinary surface area approximately equal to an interrogation spot area of x-rays" is not the same as "sizing the electrodes in relation to the x-rays", which Applicants have argued as not being disclosed in Tran et al. Tran et al. does disclose an ordinary surface area approximately equal to an interrogation spot area of x-rays, since the interrogation spot area of x-rays, when using the cell with x-ray fluorescence, will inherently have an area approximately equal to an ordinary surface area.

43. Regarding Applicants' arguments in points 20-26 of the Amendment, Applicants argue that Tran et al. does not disclose monitoring a non-saturated concentration. The Examiner disagrees. Tran et al. does monitor a non-saturated concentration prior to regeneration. In addition, as the cell is saturated, triggering means (col. 14, lines 35-44) are used when a concentration has passed a predetermined, non-saturation threshold concentration. Applicants further argue that Tran et al. does not disclose ionic release. The Examiner disagrees. Tran et al. does disclose ionic release required for regeneration (col. 15, lines 4-8). When the cell is discharged, ions are released.

44. Regarding points 27-29, Applicants argue that there is no motivation. The Examiner disagrees. See the last paragraph of point 27 above.

45. Regarding point 30, Applicants argue that the baffles of Taylor do not increase turbulence. The Examiner disagrees. The shape of the baffles would necessarily increase turbulence, which then creates the uniform extraction.

46. Regarding point 31, Applicants argue that it would not have been obvious to incorporate the Delrin® material of Taylor. The Examiner disagrees, since it is within the general skill of a worker in the art to select a known material motivated by its suitability.

47. Regarding point 32, Applicants argue that Ma makes no distinction between optimized angles and does not reference any calculations, which would allow for precise alignment of the detector or source. The Examiner disagrees. One would need to align a source and detector. If they weren't aligned, then one would not obtain a signal.

48. Regarding points 35-39, Applicants argue that the incorporation of Kapton is not obvious, since it is taught away from use. The Examiner disagrees. Just because Nelson prefers Beryllium to Kapton, does not mean the incorporation of Kapton is not obvious. It still is obvious, since it is within the general skill of a worker in the art to select a known material motivated by its suitability.

In conclusion, Applicants' arguments are not persuasive and the references remain applicable to the rejections above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gk

EDWARD J. GLICK
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